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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/618,374	07/11/2003	Tadashi Narui	37026-88081	4918
22807	7590	12/21/2005	EXAMINER	
GREENSFELDER HEMKER & GALE PC SUITE 2000 10 SOUTH BROADWAY ST LOUIS, MO 63102			LEE, EUGENE	
			ART UNIT	PAPER NUMBER
			2815	

DATE MAILED: 12/21/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

<b>Office Action Summary</b>	Application No.	Applicant(s)	
	10/618,374	NARUI ET AL.	
	Examiner	Art Unit	
	Eugene Lee	2815	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 27 September 2005.
- 2a) ☐ This action is FINAL.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-7, 12-15, 21 and 62 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 1-4 and 12-15 is/are allowed.
- 6) ☒ Claim(s) 5-7, 21 and 62 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All    b) ☐ Some \* c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |  |   |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)   | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                                   | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

## **DETAILED ACTION**

### ***Continued Examination Under 37 CFR 1.114***

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 9/27/05 has been entered.

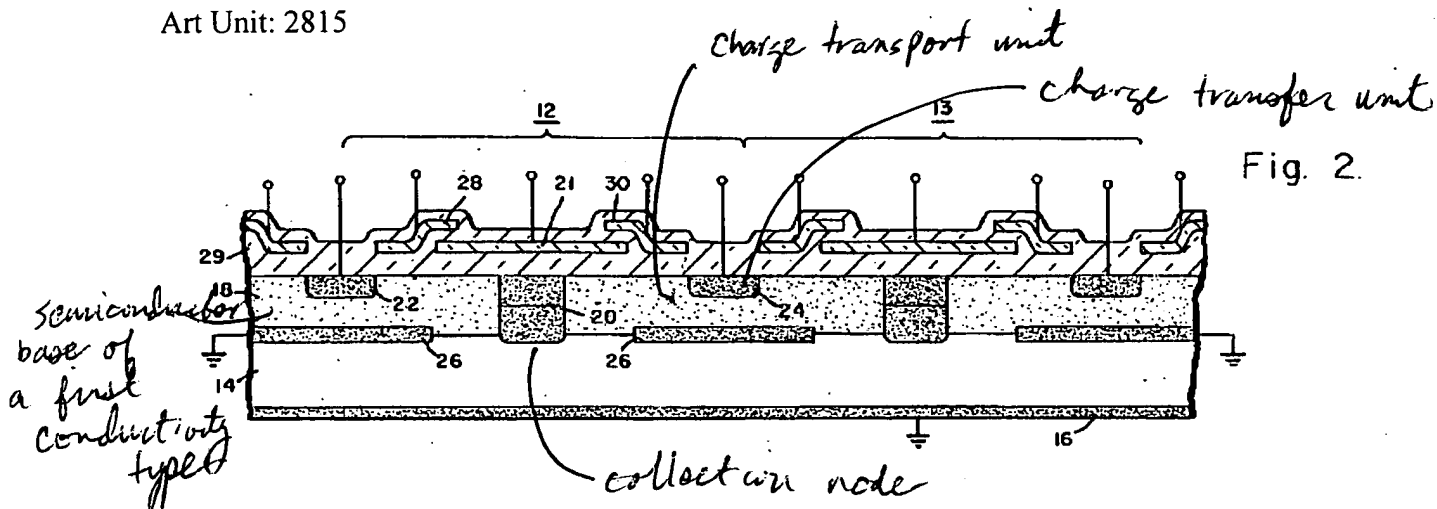
### ***Claim Rejections - 35 USC § 102***

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

3. Claims 5 thru 7, 21, and 62 are rejected under 35 U.S.C. 102(b) as being anticipated by Alexander et al. 4,198,646. Alexander discloses (see, for example, Fig. 2) an imager (back-illuminated image sensor) comprising a lightly doped p-type epitaxial layer (semiconductor base of a first conductive type) 18, n-type collection nodes (charge accumulating units) 20, output diffusion (charge transfer unit) 24, and charge transport unit.



Regarding the preamble and the “back-illuminated image sensor” contained therein, see, for example, column 1, line 64-column 2, line 4 wherein Alexander discloses incoming backside illumination generating hole-electron pairs.

Regarding the limitation “charge transport unit”, see column 2, lines 8-15, wherein Alexander discloses a path (charge transport unit) being created for the migration of the collected charge carriers from the area adjacent the collection node to the output diffusion.

Regarding the limitation “invalid charge discharging unit”, see column 5, lines 56-63, wherein Alexander discloses some excess charge removed by an overload bus, and signal charge dumped by clocking the bucket overload gates. Regarding the further limitation “which drives said charge transfer unit to discharge an invalid charge”, it has been held that a recitation with respect to the manner in which a claimed apparatus is intended to be employed does not differentiate the claimed apparatus from a prior art apparatus satisfying the claimed **structural** limitation. *Ex Parte Masham*, 2 USPQ F. 2d 1647 (1987).

Regarding claim 6, and the limitation “dark current suppressing unit”, see, for example, column 5, line 65-column 6, line 3, wherein Alexander discloses the eliminating the possibility of undesired charge overflow (dark current). Regarding the further limitation “which

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approximates a potential of the first-plane side of said charge transfer unit to a substrate potential to suppress dark current flowing in from said first-plane side, at least during a predetermined period”, it has been held that a recitation with respect to the manner in which a claimed apparatus is intended to be employed does not differentiate the claimed apparatus from a prior art apparatus satisfying the claimed **structural** limitation. Ex Parte Masham, 2 USPQ F. 2d 1647 (1987).

Regarding claim 7 and the limitation “excessive charge discharging unit”, see, for example, column 5, line 65-column 6, line 3, wherein Alexander discloses the eliminating the possibility of undesired charge overflow (excessive charge). Regarding the further limitation “which overflows an excessive charge into said charge transfer unit in a vertical direction, from the charge accumulating units on the second-plane side to the charge transfer unit on the first-plane side and drives said charge transfer unit to discharge said excessive charge”, it has been held that a recitation with respect to the manner in which a claimed apparatus is intended to be employed does not differentiate the claimed apparatus from a prior art apparatus satisfying the claimed **structural** limitation. Ex Parte Masham, 2 USPQ F. 2d 1647 (1987).

Regarding claim 21, and the limitation “charge transfer channel”, see the area between the collection node and the output diffusion 24 wherein charges are transferred from the node to the output diffusion. Regarding the limitation “transfer electrodes”, see, for example, Fig. 2 wherein Alexander discloses a transfer gate 30, which is distributed at a ratio of substantially less than there per one of collection nodes 20. Regarding the limitation “charge transport unit”, see column 2, lines 8-15, wherein Alexander discloses a path (charge transport unit) being created for the migration of the collected charge carriers from the area adjacent the collection node to the

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output diffusion. Regarding the limitation “the transport being done for one screenful of signal charges at a plurality of times while shifting the phases of positions where signal charges are to be transported” and “drives said transfer electrodes in multi-phase, each time said charge transport unit transports signal charges to said charge transfer channel, and reads out one screenful of signal charges at a plurality of times”, it has been held that a recitation with respect to the manner in which a claimed apparatus is intended to be employed does not differentiate the claimed apparatus from a prior art apparatus satisfying the claimed **structural** limitation. Ex Parte Masham, 2 USPQ F. 2d 1647 (1987).

Regarding claim 62, see, for example, FIG. 2 wherein Alexander discloses output diffusion (CCD diffusion layer) 24, insulative layer (insulating film) 29, and transfer gate (CCD electrodes) 30. Regarding the limitation “said invalid charge is discharged through the CCD diffusion layer, by the voltage drive of the CCD electrode formed on said first-plane side”, it has been held that a recitation with respect to the manner in which a claimed apparatus is intended to be employed does not differentiate the claimed apparatus from a prior art apparatus satisfying the claimed **structural** limitation. Ex Parte Masham, 2 USPQ F. 2d 1647 (1987).

***Allowable Subject Matter***

4. Claims 1 thru 4, and 12 thru 15 are allowed. The following is a statement of reasons for the indication of allowable subject matter: The references of record, either singularly or in combination, do not teach or suggest at least a back-illuminated image sensor comprising: a **depletion prevention layer** formed closer to said second-plane side than said charge

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accumulating units, the depletion prevention layer which prevents a depletion region around said charge accumulating units from reaching said second plane (claims 1-4).

The references of record, either singularly or in combination, do not teach or suggest at least a back-illuminated image sensor comprising: a **barrier region** provided on at least a part of transport paths of said signal charges formed between said charge accumulating units and said charge transfer unit, the barrier region which creates a peak of a potential barrier to block progress of said signal charges when no charge is to be transported and ensures full transportation of said signal charges by eliminating the peak of said potential barrier by said charge transport unit when a charge is transported (claims 12-15).

### *Response to Arguments*

5. Applicant's arguments filed 9/27/05 have been fully considered but they are not persuasive.

Regarding the applicant's argument on page 8 of the amendment filed 9/27/05 that the configurations of the invalid charge discharging unit in the present invention and corresponding portions in Alexander et al. are different from each other, this argument is not persuasive. Whether the configurations are different, it does not differentiate from the applicant's claim which states an invalid charge discharging unit which Alexander discloses (see column 5, lines 56-63) wherein Alexander discloses some excess charge removed by an overload bus, and signal charge dumped by clocking the bucket overload gates. Any charges (i.e. signal charges) that are dumped are invalid charges since they are removed from the imager, and not used. On top of page 9, the applicant asks "Where is the corresponding structural features in Alexander et al. that

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Examiner contends anticipate the apparatus set forth in claim 5". See, for example, Fig. 2 wherein Alexander discloses a bucket overload gate 28/overload bus (not shown) which are interpreted by the Examiner as the "invalid charge discharging unit" since they remove charges from Alexander's device. These structural features may not be the same as the applicant's intended structure as disclosed in the specification, however, claim 5 does **not state any structural features** of the invalid charge discharging unit but only its function (i.e. charge transfer unit to discharge an invalid charge while said charge accumulating units accumulate said signal charges), which Alexander discloses. The output diffusion 24 "outputs" the dumped the signal charge (see column 7, lines 18-21), and the collection nodes 20 "collect" charges. However, the manner in which a claimed apparatus is intended to be employed does not differentiate the claimed apparatus from a prior art apparatus satisfying the claimed structural limitation. *Ex Parte Masham*, 2 USPQ F. 2d 1647 (1987). The Examiner stresses that the claim 5 does not recite any structural features of the "invalid charge discharging unit" and, therefore, claim 5 does not differentiate from Alexander's invention.

Regarding the applicant's argument on 17 that Alexander can not suppress the dark current, as in the present invention, this argument is not persuasive. Similar to the response above, the language (i.e. approximates a potential of the first-plane side of the charge transfer unit to substrate potential to suppress dark current flowing in from the first-plane side) is functional, and does not differentiate the claimed apparatus from the prior art apparatus satisfying the claimed structural limitations. However, Alexander does disclose (see, for example, column 5, lines 65-column 6, line 3) a dark current suppressing unit in that the transfer gate 30 eliminates the possibility of undesired charge overflow (dark current). In addition, like



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above, claim 6 does not state any structural features of the dark current suppressing unit, and therefore, does not differentiate from Alexander's invention.

Regarding the applicant's argument on the bottom of page 19 that the Examiner has ignored all of the so-called "structural" limitations not being met by Alexander et al. and so Ex parte Masham is not relevant, this argument is not persuasive. Alexander discloses (see, for example, column 5, lines 65-column 6, line 3) an excessive charge discharging unit in that the transfer gate 30 eliminates the possibility of undesired charge overflow (excessive current). Similar to the two responses above, the language (i.e. which overflows an excessive charge into said charge transfer unit) is functional, and does not differentiate the claimed apparatus from the prior art apparatus satisfying the claimed structural limitations. And like the responses before it, claim 7 does not disclose any structural features of the excessive charge discharging unit, and therefore, is not structurally differentiated from Alexander's invention.

### ***Conclusion***

**THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event,

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however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

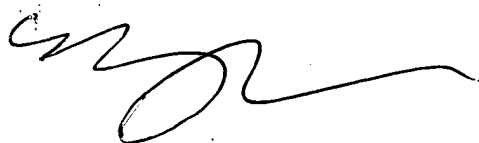
### **INFORMATION ON HOW TO CONTACT THE USPTO**

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Eugene Lee whose telephone number is 571-272-1733. The examiner can normally be reached on M-F 8-5.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Tom Thomas can be reached on 571-272-1664. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Eugene Lee  
December 17, 2005

A handwritten signature in black ink, appearing to be 'Eugene Lee', written in a cursive style.